Input File(Transaction DB)(as “input.txt”) :-

T1 a b c e
T2 b d f
T3 a c d f
T4 d f
T5 c d e
T6 g h i

PART I:- Unrandomised data retrieval

Q1. Count of all products bought.
Ans:

```
#include<bits/stdc++.h>
using namespace std;

int main()
{
freopen("input.txt","r",stdin);
freopen("output.txt","w",stdout);
string data;
map<string,int> freq;
//string str="";
while(cin>>data){
if(data.front()>='a' && data.front()<='z'){
freq[data]+=1;
}
}
for(auto it=freq.begin();it!=freq.end();it++){
cout<<it->first<<" "<<it->second<<"\n";
}
return 0;
}
```

Output:
a 2
b 2
c 3
d 4
e 2
f 3
g 1
h 1
i 1

Q2. Reverse the DB
Ans:

```
#include<bits/stdc++.h>
using namespace std;
int main()
{
```

```
freopen("input.txt","r",stdin);
freopen("output.txt","w",stdout);
string data;
map<string,vector<string>> mp;
string transac;
string temp;
while(getline(cin,data)){
stringstream stream(data);
int count=0;
while(getline(stream,temp,' ')){
if(count==0){
transac=temp;
}
else{
mp[temp].push_back(transac);
}
count++;
}
}
//map<string,vector<string>>::iterator it;
for(auto it=mp.begin();it!=mp.end();it++){
cout<<it->first<<" ";
for(int i=0;i<it->second.size();i++){
cout<<it->second[i]<<" ";
}
cout<<"\n";
}
return 0;
}
```

Output:
a T1 T3
b T1 T2
c T1 T3 T5
d T2 T3 T4 T5
e T1 T5
f T2 T3 T4
g T6
h T6
i T6

PART II:- Randomized data retrieval
(Note: in all the outputs, the last line is used to denote the range of transactions it covers. Also, for each transaction, the number of parameters taken are also randomized)

Q1. Count of all products bought.
Ans:

```
#include<bits/stdc++.h>
using namespace std;
int main()
```

```
{
srand((unsigned) time(0));
freopen("input.txt","r",stdin);
freopen("output.txt","w",stdout);
int ref1=rand()%6+1;
int ref2=rand()%6+1;
int l=min(ref1,ref2);
int r=max(ref1,ref2);
ostringstream stream;
string left="T",right="T";
stream<<l;
left+=stream.str();
ostringstream stream2;
stream2<<r;
right+=(stream2.str());
string data;
map<string,int> freq;
while(cin>>data){
if(data==left){
//stringstream sin(data);
srand((unsigned) time(0));
string d;
int count=0;
int stop=rand()%4+1;
while(cin>>d){
if(d==right){
break;
}
if(count<stop && d.front()>='a' && d.front()<='z'){
freq[d]+=1;
count++;
}
else if(d.front()=='T'){
count=0;
}
}
break;
}
}
for(auto it=freq.begin();it!=freq.end();it++){
cout<<it->first<<" "<<it->second<<"\n";
}
cout<<left<<" "<<right;
return 0;
}
```

Output:
b 1
d 1
f 1
T2 T3

Q2. Reverse the DB
Ans:

```
#include<bits/stdc++.h>
using namespace std;
int main()
{
srand((unsigned) time(0));
freopen("input.txt","r",stdin);
freopen("output.txt","w",stdout);
int ref1=rand()%6+1;
int ref2=rand()%6+1;
int l=min(ref1,ref2);
int r=max(ref1,ref2);
ostringstream stream;
string left="T",right="T";
stream<<l;
left+=stream.str();
ostringstream stream2;
stream2<<r;
right+=(stream2.str());
string data;
map<string,vector<string>> rev;
while(cin>>data){
if(data==left){
srand((unsigned) time(0));
string d;
int count=0;
int stop=rand()%4+1;
string transac=left;
while(cin>>d){
if(d==right){
break;
}
if(count<stop && d.front()>='a' && d.front()<='z'){
rev[d].push_back(transac);
count++;
}
else if(d.front()=='T'){
transac=d;
count=0;
}
}
break;
}
}

for(auto it=rev.begin();it!=rev.end();it++){
cout<<it->first<<" ";
for(int i=0;i<it->second.size();i++){
cout<<it->second[i]<<" ";
```

```
}
cout<<"\n";
}
cout<<left<<" "<<right;
return 0;
}
```

Output:
a T1 T3
b T2
c T5
d T4
T1 T6

Please find below the drive link for the above Labwork.

https://drive.google.com/drive/folders/1iYl-VAsB_5xZ4FRjc5V9Rr4ps-gTX_na?usp=sharing